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PSYCHOLOGY AND SCIENTIFIC METHODS

DUALISM IN ANIMAL PSYCHOLOGY¹

THE second edition of Professor Washburn's text-book in animal psychology indulges as little as the first in controversy over matters of general theory. Indeed the chief purpose for which the book was written (as the author stated in the Introduction to the first edition) was to bring together, and make available for the ordinary student, the simple facts whose discovery is the result of experimental method in comparative psychology. And it is the rapid accumulation of such facts discovered since the first appearance of *The Animal Mind* in 1908, that has led the author to prepare a second edition, a task which involved the rewriting of more than half of the earlier volume. Of the growth of theoretical controversy which has accompanied this rapid advance in comparative psychology during this decade, little intimation appears in the text. Text-books are not, of course, the place to discuss such subjects. Yet the reader who peruses the pages of *The Animal Mind* with the issues of current controversy in the back of his head may well find food for philosophical reflection. For the interesting facts of animal behavior which the author sets before us in so orderly and clear a manner are not, after all, presented merely as interesting facts. They are selected and ordered that they may serve as evidence from which the animal mind—or minds—may be *deduced*. As the author herself remarks in the Introduction, the book might properly be entitled *The Animal Mind as Deduced from Experimental Evidence*. It is the conception of the object of psychology, implied in this title and explicitly laid down in the opening chapters, which gives pause to the theoretically-minded reader.

The conception is a familiar one. The only mind which the psychologist, or any individual, can know is his own mind; and this he knows directly and immediately. The only way in which the psychologist can learn to know the mind of another conscious being is to ask himself how he would feel and think in the other's place.

¹ M. F. Washburn, *The Animal Mind*, second edition, revised. New York: The Macmillan Company, 1917.

Just in so far as he is able to answer this question, can he gain any insight into the other's mind. It evidently follows that each of us can know the conscious processes of others only in so far as they are like our own. In so far as they differ from our own they must remain a sealed book to us. Furthermore, the feelings and thoughts of others to be understood must not only *be* like our own; they must also express themselves in similar words or acts. It is a fundamental postulate of all psychology, human and animal, that like behavior is evidence of like conscious processes. There are thus great difficulties lying in the path of the comparative psychologist. He may perhaps hope to reconstruct imaginatively the feelings of the questing dog or the racing horse; but to put himself in the place of the buzzing wasp or the wriggling worm is beyond his powers. Nevertheless, precarious and devious as the path of the comparative psychologist must be, it is the only way open, and some progress is possible, and has, indeed, already been made.

Thus, according to this conception, two distinct but equally important tasks confront the investigator of the animal mind: first, the discovery and description of the facts of animal behavior; second, the psychological interpretation of those facts. In order successfully to accomplish the first, training is necessary to distinguish the simple facts from the interpretation of them—what is actually seen from what is merely inferred. But since what can be observed is only external behavior, *i. e.*, physical movements, the peculiar task of the psychologist, as distinct from the biologist, remains to be performed: the inference as to what conscious processes, if any, accompany these acts.

The frank and clear-cut statement of this familiar position which is given in the opening chapters raises squarely a number of fundamental problems. What is the aim of psychological science? Is the goal of the psychologist the imaginative reconstruction of the experience of the conscious being he is studying? Surely not, since the pursuit of science is essentially a social enterprise, and the body of facts and theories constituting a science is a common object. Psychology, in so far as it is a science, we should all agree, consists in the *description* of the facts concerning minds, and the *statement* of the systematic interconnection of these facts.

What Professor Washburn and others of her school evidently mean to claim is that it is only in so far as we can imagine the sensations and feelings of another that we are prepared to give a psychological account of them, or understand the account given by any one else. Now this claim, while it is so plausible that to question it may seem mere perversity, I find great difficulty in admitting. For one thing, it carries with it the acceptance of a whole body of

logical doctrine to which there are grave objections. This is too large a subject to enter upon here. Viewed more directly and empirically, the claim raises equally serious doubts. The old objection, that, if our knowledge of the sensations and emotions of animals depended on the possibility of translating them into terms of our sensations and emotions, no psychology of the lower animals would be possible, seems to me unanswerable. That after so staggering a presentation of the difficulties of comparative psychology as our author gives us in the first chapter she can yet believe in the fruitfulness of the enterprise, is an arresting observation. One is compelled to ask whether the enterprise be, after all, the sort of intellectual adventure it is pictured as being.

Let us examine it a little more closely. When I see my dog running along the walk with his nose to the ground, and I know one of the children went that way to school a half-hour ago, I describe his experience as an attentive discrimination of the odor of the child with a feeling tone of pleasurable excitement. This is a description which has an intelligible and fairly definite meaning to any one of us. And yet no one of us ever had such a total experience nor even, perhaps, experienced a single one of the essential elements entering into it. The individual human being has for us no distinctive odor when he is clean, whereas we know that for the dog each person of his acquaintance has an unmistakable odor, and that the characteristic odor of his master is highly agreeable in a peculiar way. To me, as I suppose to most of us, the idea of a distinctive odor attaching to a person is unpleasant. Even if this were not so, I could not imagine an odor having the peculiar emotional coloring which the odor of his master has for the dog—which leads him, for example, to find solace and contentment in lying on an old glove or other article of clothing. It is true I have had various experiences of pleasurable excitement attaching to odors. The smoke of a locomotive always had a peculiarly delightful exciting quality; but it does not seem to me that my understanding of the experience of the dog who follows the child so eagerly is brought about by calling up this pleasurable excitement and translating the dog's experience in terms of that. It even seems to me very improbable that the description of the dog's experience would be unintelligible to me even though some accident had deprived me in youth of all sense of smell. Is Helen Keller debarred from entering into an intelligent discussion as to whether the white rat has color-vision, because she can not imagine red and blue? That her blindness would entail serious disadvantages to her psychological study of vision is undoubtedly true; but that it would make the psychology of vision unintelligible to her is not credible.

The crucial question is: What do such psychological terms as red

and anger and unpleasantness and space-perception *mean*? Does each denote a "this," an incommunicable bit of private experience, which each one of us identifies to himself by calling it up in imagination? If so, how can we manage to be mutually comprehensible? Perhaps our author would answer that while I do denote such a "this" by red or anger, I may enable you to identify a similar "this" by describing it in terms of the external relations it bears to stimulus on the one hand and response on the other, just as a description may be used to indicate the denotation of any proper name. What red or anger *denotes* is a bit of private feeling, and it is this that the psychologist studies. To this contention the reply is that such a merely private and incommunicable somewhat can not become the object of scientific investigation. And if this reply seem a piece of *a priori* dogmatism, we may point to the empirical facts themselves.

The psychological uniformities holding of sensation-qualities of color, such as the laws of color-contrast, relation of brightness and saturation, *etc.*, are all *formulations of uniformities of discriminative responses to objectively standardized conditions*. Does the psychologist wish to determine the complementarity of a certain shade of red? He selects a piece of colored paper of a standard make and grade, gives it a determinate illumination, places a normal observer in a standard relation to it, *etc.*, *etc.* In short, what he is studying is no "this;" it is the standard paper in a certain complex set of relations to the observer. The importance and the significance of the introduction of experimental method in psychology lies precisely in the fact that it provides a means for the determination of psychological phenomena. *The phenomena thus investigated become in effect functions of the factors constituting the standardized conditions of the experiment*. It must not be suggested, however, that this means the identification of psychological research with either physical or biological science. The psychological standardization of the conditions of experiment is almost never equivalent to a physical or mechanical standardization of them. What may constitute a wide variation in conditions mechanically considered, may well fall within the limits of psychological constancy for the particular experiment in hand. Nor is this determined by an unchecked introspection that a given variation does not "look" or "feel" different, but by further experiments which act as mutual checks.²

² For example, an illumination may be psychologically constant, even though there be mechanically measurable variation. But a mechanical variation which is too slight to be directly discriminated may nevertheless count as a psychological variation. If it should be found that such a change in degree of illumination was followed by a constant variation in the results of observations of mini-

In short, one of the most important tasks of the psychologist is the determination of what constitutes the standardization in typical cases.

What has just been said refers primarily, of course, to the investigation of sensation-qualities, which is one of the fields where experiment has proved most fruitful. But it is not less true that other psychological terms such as those mentioned above—anger, unpleasantness, space-perception—denote phenomena which can be determined only by the relations which they bear to stimulus and response. What the psychologist actually means by anger, for example, is an emotional attitude which manifests itself in a certain characteristic mode, or rather modes, of behavior. It is often asserted that anger is first known as a peculiar inner state by each individual, which is later ejectionally attributed to others as a result of inference from behavior. Now as a genetic account of the empirical origin of our idea of anger, this seems to me to be on a par with the explanation of simple spatial ideas as due to inferences made in early childhood from differences in sense-data. The child surely perceives his nurse's anger as immediately as he does her position between the chair and the table—nay, even more directly, since he instinctively responds to her loud threatening tones and her scowling face, while he must learn by experience what modifications of response the position between chair and table call for. But neither the perception of anger nor that of position is the result of *inference*, but of something much simpler and more direct. Later on, when anger is discriminated by name, it is as likely to denote the attitude Daddy will have if one is naughty, as one's own feelings when one throws a toy across the room or slaps sister.

It is an experience which all of us must sometime have had, to be suddenly accused of being angry in the midst of eager discussion. After the first tendency toward indignant denial, we may, perhaps, recognize the justice of the accusation. Now on what is such recognition based? Is it not largely because we catch the echo of our own raised voice, or become aware of our menacing attitude toward our companion? Sometimes, indeed, we may be frankly doubtful whether we were angry or not, if there be no manifest evidences of it. It is, of course, very difficult to make a reliable introspection; one is inevitably prejudiced. But it seems clear to me that what we mean by "being angry" is not the enjoyment of a subjectively identifiable mental process. No psychologist, I venture to assert, ever discriminated such a process and mentally labelled it "anger"

mal changes in grays, or that the rate of eye fatigue varied with the change in illumination, such change would be classed as truly psychological.

for purposes of scientific reference and comparison. Suppose he had done so, and tried to classify later experiences as "anger" or "not-anger" by comparison with this. He would find himself in serious perplexity, first, because it is very difficult to recall a past emotional state for purposes of comparison; and second, because he would probably find himself using the term in an arbitrary way, and making statements which could not be verified by others. As a matter of fact "being angry" seems to cover a somewhat indefinite range of feeling. Cold, still anger is a somewhat different feeling from hot, passionate anger; nor does it seem probable that a psychologist continues to classify them as varieties of a common species because of any identical element in the two experiences. What psychology has done, indeed, just as what every science must do, is to take over classifications and distinctions from common sense and gradually to reconstruct and systematize them. In the case of the emotions, psychology has as yet made but slight progress. Anger and fear as used by psychologists are practically common-sense terms. They can be made scientific, *i. e.*, be given that definiteness of denotation and connotation which science demands, only as they are formulated as determinate functions of behavior.

If the foregoing contention is just as regards emotion, it is more evidently so as regards such a phenomenon as space-perception. Space-perception, unlike red or anger, is no particular conscious experience. Rather it designates a class under which practically all our sensory experiences fall. It can not be said of space-perception, as it is said of a sensation-quality or an emotion, that it is something we first become acquainted with in our own experience and then attribute to others. In one sense of that much-abused term "acquaintance" I am indeed acquainted with space-perception, since my experience includes or involves it; but this sort of acquaintance does not take me very far toward my goal of scientific identification and description. Just what are the specific differentiae of space-perception? The attempts to answer this question constitute a long chapter in psychological controversy. Professor Washburn judiciously speaks of it as "involving the simultaneous awareness of a number of sensations consciously referred to different points in space." But what is a conscious reference to different points in space? It must include the experience of the two-year-old child who persistently tries to put the largest block of his nest of blocks into the smallest, and the experience of the skillful dressmaker, who after a brief inspection of an illustration of a complicated garment cuts a pattern for it offhand. "Conscious reference," or "localization," would seem to stand in need of further analysis before it can be made the basis of definite and hence fruitful inquiry regarding the

experience of the sea-urchin or the stickleback. That a scientific study of different levels or types of space-perception and of their relationship to each other can be made without constant dependence on standardization in terms of stimulus and response does not seem possible. Space-perception is not an inner mental state whose relations to behavior are merely external. On the contrary, psychology is forced to treat the relationship to response as constitutive and determinative of the phenomena it studies.

At this point it seems well worth while to raise the following question: How different in actual procedure and in results is a study of animal mind and behavior carried out from the standpoint of such a dualism as our author's, from a similar study made by a behaviorist?

The bulk of *The Animal Mind* is taken up with an investigation of the number and kind of sensory elements which enter into animal consciousness at different levels. There is first a chapter on sensory discrimination in general, dealing with the problem as to what constitutes evidence for the presence of distinct sensory qualities. This is followed by chapters on the special senses: the chemical sense (including taste and smell), hearing, and vision. Later chapters deal with space-perception, modification of conscious processes by experience, and lastly attention. In the chapter on the criteria of sensory discrimination, the author argues that the fact that an animal responds in some way to a given stimulus, *e. g.*, sound waves, is not evidence that the animal consciously discriminates such a stimulus as qualitatively distinct. "It is not," she writes (p. 57) "the number of stimuli to which an animal reacts that can be taken as evidence of the qualitative variety of its sensations, but the number of stimuli to which it gives different reactions." Even this, however, we are told, is probably too simple a statement of the case. A given type of stimulus, *e. g.*, sound waves, may be perceived as qualitatively distinct even though it brings out no specific direct reaction. If it brings out distinctive modification of other reactions we give it a place among the sensation-qualities of the animal's experience.

Now while the language used is different, and while the problems set for investigation are differently formulated, the difference between the treatment given in this and the succeeding chapters, and a frankly behavioristic treatment is far less radical than one might suppose. To ask: "Does the white rat have color-sensations, and if so which ones?" is not practically different from asking: "Does the white rat specifically discriminate chromatic wave-lengths?" And the case is similar throughout the whole range of sensory discrimination. The actual concrete problems which the dualistic psycholo-

gist is interested in investigating are essentially the same problems which the behaviorist is led to study. What the dualist does in effect is to *add on* an interpretation which can be only characterized justly as "metaphysical." By this I mean that just in so far as the dualist claims to infer from the facts of behavior the existence of an inner order of being, related in an inscrutable manner to those facts, he is stepping outside the bounds of scientifically verifiable hypothesis and entering upon purely metaphysical speculation in the bad sense of the term. To the actual empirical investigation of animal psychology such an attempted interpretation adds no significance.

The "epiphenomenal" character of such interpretation comes out clearly in the treatment of various topics. Indeed the treatment of the criteria of the presence of consciousness itself is a case in point. In the early chapter on the *Evidence of Mind* the author argues that none of the proposed tests for the inference of mind from structure or behavior is conclusive. Her conclusion is that no evidence exists for either denying or affirming the presence of consciousness in animals below the very highest, and that "for all we know it may exist in simple forms until we reach the very lowest of living beings" (p. 37). Such a position is, it seems to me, inevitable so long as one conceives consciousness as a superadded thing related to behavior in a purely external way. For the presence or absence of such a metaphysical entity there can be no evidence. But, on the other hand, the hypothesis that such an entity is or is not present can make no difference in the scientific treatment of the concrete phenomena of animal psychology. Thus when the question is asked whether an animal discriminates the visual qualities "red" and "blue," the actual answer of the dualistic psychologist is no whit different from that of the behaviorist. "No evidence of discrimination between two stimuli on an animal's part," writes Professor Washburn (p. 53), "can do more than show us that for the animal they are different; just what the quality of the sensation resulting from each may be, whether it is identical with any sensation quality entering into our own experience, we can not say. The light rays which to us are red and blue may for an animal's consciousness also differ from each other, and yet if our experience could be exchanged for the animal's, we might find in the latter nothing like red or blue as we know them." The same might of course be said of the sensory discrimination of a fellow man, even though he were a trained introspectionist. To assert: "*A* experiences the sensation qualities red and blue," and "*A* has the capacity for discriminatory response to the corresponding wave-lengths," are not descriptions of two different facts, but merely different descriptions of one and the same fact. The belief of the dualist that there is really a difference be-

tween the two facts is a belief which, by Professor Washburn's own admission, could only be justified by an appeal to a supernatural insight. For the supposition that "if our experience could be exchanged for the animal's we might find in the latter nothing like red or blue as we know them," is essentially an appeal to a sort of knowledge which only a God might enjoy, or perhaps a mortal blessed with a magic power.

One might, if it were worth while, take up one after another the particular problems of sensory discrimination discussed by our author and show that the so-called psychological interpretation of the facts of behavior is either a pure piece of metaphysical speculation, or else merely such a classification of them as a behaviorist might make. The positive scientific conclusions reached in each case differ only in mode of formulation. Let one more instance suffice—the case of what is called by the dualist the "sense of hearing" in frogs and by the behaviorist the "auditory response" of frogs. The case has been of interest to investigators because frogs under experimental conditions have not given evidence of hearing, *i. e.*, specific response to noises. Frogs do, however, possess specialized auditory apparatus and in their native habitat appear to respond to the croaking of their fellows. Observation by Yerkes³ revealed the apparent fact that they depend almost wholly upon visual stimuli for avoidance of danger. Upon experiment it was found that while no direct specific response was given to auditory stimuli, such stimulation had a specific indirect effect in modifying reaction to other stimuli, which was particularly marked during the mating season, and which ceased when the auditory nerve was cut. On this evidence the dualist decides that probably the frog does possess a sense of hearing or have "true auditory sensations," while the behaviorist is content to ascribe merely a capacity for "limited auditory response." But unless the dualist distinguishes his conclusion as one verifiable only by supernatural insight, he must be content to equate it with that of the behaviorist.

And yet in spite of what seems to me the fatal weakness of the dualist's position, his protest against the claims of *mechanistic* behaviorism must be granted a large justification. As against the claims of a Bethe or a Loeb, the dualism of Professor Washburn is indeed inevitable. And such a formulation as theirs of the behaviorist position is apparently the only alternative to dualism considered by our author. The behavior of animals, in her view as in the view of the mechanists, is adequately describable as a series of physico-chemical processes, so that if psychological science can not

³ Cited by Professor Washburn, *op. cit.*, p. 130, and by Professor John B. Watson, *Behaviorism*, p. 387.

legitimately infer inner psychical states as the accompaniment of these processes, it must confine itself to the observation and measurement of these purely physical phenomena themselves.

Accordingly we find our author writing: "If a physiologist perfected an instrument by which he could observe the nervous process in my cortex that occurs when I am conscious of the sensation red, he would see nothing red about it; if he could watch the bodily movements that result from this stimulation, say, for instance, the slight contraction of the articulatory muscles that occurs when I say "red" to myself, he would not see them as red. *The red is in my consciousness, and no devices for observing and registering my movements will ever observe the red, though they may easily lead to the inference that it exists in my consciousness.* And precisely the same is true of all my sensations, thoughts, and feelings" (pp. 23-24; italics mine).

If certain behaviorists had not actually laid themselves open to the charge of identifying red with a form of nervous discharge, it would be incredible that such a doctrine should be deemed worthy of serious criticism. Need it be pointed out that not even mechanics confines itself to existents that can be observed? As well might a metaphysical physicist declare that since no observation of physical changes yielded a glimpse of energy, he must either deny its existence outright or else assign it to a transcendental realm. The behaviorist surely can claim the same theoretical advantages enjoyed by scientists in other fields. It is open to him to assert of the subject's red—as the physical chemist asserts of the electrical charge of the ion—that it is a function of directly observable phenomena; in this case, of discriminative responses to a set of standardized conditions. What the red may be "in itself" or for a supernatural insight with which he may imagine himself to be endowed, the psychologist has no more concern than the physicist. That such a theoretical formulation accords with the actual empirical procedure of psychology has already been argued.

What stands in the way of such a formulation is the status of introspection as a psychological method. The mechanistic behaviorist would either ignore it or consign it to the scrap-heap without further consideration; while for the dualist it is enshrined as the indispensable and sacred method of the true faith. But as a matter of fact the one rejects it and the other clings to it for the same reason. It is because both alike regard it as a sort of observation wholly different from the observation of objective phenomena engaged in by the behaviorist, an immediate vision of an inner world hidden from all but one. The mechanistic behaviorist is led by this preconception to deny the value of the empirical fruits of intro-

spection; the dualist, made confident by the attested value of the empirical fruits, entrenches himself the more obstinately in his theoretical conceptions.

But we may ask: May not behaviorism find a place for much of the empirical procedure which is labelled introspection; and may not one be convinced of the fruitfulness of introspective investigation without becoming a dualist? That is for me the critical question of psychological methodology.

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OTHER MEN'S MINDS

THE common unformulated notion that we have an intuitive knowledge of other men's minds persists in the conceptions of careful thinkers notwithstanding perfectly obvious objections to such a view.

For instance, we attribute consciousness not only to man, but also to some animals. Is this attribution based upon the same unassailable intuition? If it is, why is it that we are so uncertain in making this attribution? Why do we unhesitatingly agree that the dog and the horse have consciousness, but find it difficult to agree as to its existence, or non-existence, in connection with the life of the ant and of the bee? Is it not evident that in the case of the animal world we are dealing with modes of interpretation based upon data that are at times equivocal?

The data we employ in the case of animals is very evidently found in their behavior. Is it not clear that we also attribute minds to other men as the result of a similar interpretation? And if this is true, why should we assume that we have a very special intuitive knowledge, transcendent of experience, which leads us to attribute consciousness to other human beings than ourselves? Let us examine this subject in some detail.

In everyday life we are concerned with the consideration of what we, when we become sophisticated, call objects-in-the-outer-world. Changes in these objects under changed conditions we speak of as their behavior. The word behavior is, however, generally specially applied to changes in living animals, and especially in men-animals; and as the behavior of men-animals is most significant in our lives, it is more often noted than that of other animals.

Now each human individual realizes that he himself is a man-animal; and each of us observes his own behavior more constantly, and more carefully, than that of any other man-animal. With certain forms of this behavior of our own which are hesitant, and